WHAT IS CLAIMED IS:

1. A method for manufacturing a GaN based compound semiconductor light-emitting device, comprising the steps of:
   (a) forming an n-GaN based layer over a substrate after a buffer layer is formed over said substrate;
   (b) forming a multi-quantum well (MQW) active layer over said n-GaN based layer;
   (c) forming a p-GaN based layer over said MQW layer and etching away a portion of said n-GaN, MQW active and p-GaN layers whereby an exposing region is formed on said n-GaN based layer and an exposing surface is formed on said p-GaN based layer; and
   (d) forming an impurity doped ZnO based layer as a light extraction layer over said exposing surface after said etching of said n-GaN layer, MQW active layer and p-GaN based layers, wherein said doped ZnO based layer is doped so that said doped ZnO based layer is light transparent and conductive ; and
   (e) forming a p-type electrode over said light extraction layer after said etching and forming an n-type electrode over said exposing region of said n-GaN layer.
2. According to the method in Claim 1, wherein said doped ZnO based layer comprises ZnO, $Sn_xZn_{1-x}O$, $In_xZ_{1-x}O$ and $In_xSn_yZn_{1-x-y}O$, wherein $0 \leqq X \leqq 1$, $0 \leqq Y \leqq 1$ and $0 \leqq X + Y \leqq 1$, and wherein said impurity comprises p-type and n-type impurities.

3. According to the method in Claim 2, wherein said p-type impurities comprises Al.

4. According to the method in Claim 1, wherein said light extraction layer has a thickness of 50Å to 50 μm.

5. According to the method in Claim 1, wherein said substrate may be light transmissive or opaque and comprises sapphire, Si or SiC.

6. According to the method in Claim 1, wherein said doped ZnO based layer is at least transparent to a light having a wavelength of 400-700 nm.

7. The method according to Claim 4, wherein when said light extraction layer has a thickness being at least 1 μm, said method further comprises a step between said steps of (d) and (e) or succeeding to said step (e):

(f) subjecting said doped ZnO based layer to a surface treatment by roughening or particularly texturizing whereby a plurality of facets are formed on said doped ZnO based layer.

8. A GaN based compound semiconductor light-emitting device, comprising:

a substrate;

a multi-layer epitaxial structure comprising:

a buffer layer being an LT-GaN / HT-GaN layer formed over an upper surface of said substrate, wherein said LT-GaN is a low temperature layer first formed over said substrate, and said HT-GaN layer is a high temperature layer then formed over said LT-GaN layer;

a first semiconductor layer being an n-GaN based compound semiconductor layer formed over said buffer layer;

a light generating layer being a GaN based compound

semiconductor active layer comprising a GaN multi-layer quantum well (MQW) layer; and

a second semiconductor layer being a p-GaN based compound semiconductor formed over said light generating layer;

a light extraction layer being an impurity doped metal oxide transmissive to light and formed over said second semiconductor layer and comprising impurity doped ZnO based layer;

an n-type metal electrode disposed over an exposing region of said first semiconductor layer; and

a p-type metal electrode disposed over said light extraction layer.

9. According to the light-emitting device in Claim 8, wherein said substrate has a thickness of 300-450 μm, said LT-GaN has a thickness of 30-500 Å, said HT-GaN has a thickness of 0.5-6 μm, said first semiconductor has a thickness of 2-6 μm and said second semiconductor layer has a thickness of 0.2-0.5 μm, and said second semiconductor layer is selected from a group consisting of a p-GaN, a p-InGaN and a p-AlInGaN epitaxial layers.

10. According to the light-emitting device in Claim 8, wherein said light generating layer further comprises an InGaN/GaN MQW layer.

11. According to the light-emitting device in Claim 8, wherein said light generating layer further comprises an AlGaInN based compound semiconductor epitaxial layer.

12. According to the light-emitting device in Claim 8, wherein said light extraction layer further comprises a layer selected from a group consisting of an impurity doped $In_xZn_{1-x}O$ impurity doped metal oxide layer, an impurity

doped $Sn_xZn_{1-x}O$ impurity doped metal oxide, wherein $0 \leqq X \leqq 1$, and an $In_xSn_yZn_{1-x-y}O$ impurity doped metal oxide layer, wherein $0 \leqq X \leqq 1$, $0 \leqq Y \leqq 1$ and $0 \leqq X+Y \leqq 1$, and said impurity comprises a p-type impurity and an n-impurity.

13.According to the light-emitting device in Claim 8, wherein said light extraction layer further comprises an impurity doped metal oxide having an index of refraction of at least 1.5.

14. According to the light-emitting device in Claim 12, wherein said p-type impurity comprises Al.

15. According to the light-emitting device in Claim 8, wherein said light extraction layer further comprises a metal oxide doped with a rare earth element.

16. According to the light-emitting device in Claim 8, wherein said light extraction layer comprises an impurity doped metal oxide having a transmissive range for a light having a wavelength of 400 to 700 nm.

17. According to the light-emitting device in Claim 8, wherein said light extraction layer has a thickness of 50Å to 50 μm.

18. According to the light-emitting device in Claim 17, wherein when said light extraction layer has a thickness of at least 1 μm, said light extraction layer has a roughened or particularly textured surface comprising a plurality of facets.

19. According to the light-emitting device in Claim 18, wherein said particularly textured surface comprises a cone-shaped textured surface, wherein said cone comprises a cone with a triangular bottom, a cone with a

rectangular bottom and a cone with any other shaped bottom.

20. According to the light-emitting device in Claim 19, wherein said particularly textured surface comprising a plurality of recesses, each of the recesses has a suitable distance with an adjacent recess as a conductive path and arranged in a particular form selected from a group consisting of triangular, rectangular, polygonal, diamond and any other geometrical forms.

21. A method for manufacturing a GaN based compound semiconductor light-emitting device:

forming a multi-layer epitaxial structure over a substrate, wherein said multi-layer epitaxial structure includes a p-type semiconductor layer, an active layer and an n-type semiconductor layer;

forming an impurity doped metal oxide having a suitable thickness and a light transmissibility over said multi-layer epitaxial structure as a light extraction layer; and

disposing an n-type electrode over an exposing region of said n-type semiconductor layer and disposing a p-type electrode over said light extraction layer.

22. According to the method in Claim 21, wherein said impurity doped metal oxide layer is selected from a group consisting of an impurity doped ZnO layer, an impurity doped $In_xZn_{1-x}O$ layer, an impurity doped $Sn_xZn_{1-x}O$ layer and an $In_xSn_yZn_{1-x-y}O$ layer, wherein $0 \leqq X \leqq 1$, $0 \leqq Y \leqq 1$ and $0 \leqq X+Y \leqq 1$.

23. According to the method in Claim 21, wherein said impurity doped metal oxide layer is formed through a technology selected from a group consisting of self-texturing by sputtering, physical vapor deposition, ion plating, pulsed

laser evaporation chemical vapor deposition and molecular beam epitaxy technologies.

24. According to the method in Claim 21, wherein said impurity comprises a p-type impurity and an n-type impurity.

25. According to the method in Claim 24, wherein said p-type impurity comprises Al.